

Implementation of the Bay Mercury TMDL requires Waste Discharge Requirements and Section 401 certifications for wetland projects to include provisions that restored wetlands be designed and operated to minimize methylmercury production, with the goal of causing no net increase in mercury or methylmercury loads to the Bay. Additionally, projects must include pre- and post-restoration monitoring to demonstrate compliance. As discussed in the Linkage Analysis (Section 10, this Report) there is a strong relationship between DO concentrations and the level of MeHg. Therefore, actions to implement the Suisun Marsh DO TMDL and maintain adequate DO levels are expected to reduce MeHg concentrations and better protect aquatic life beneficial uses in Suisun Marsh. These actions will also contribute to the overall reduction in mercury levels in San Francisco Bay, lower mercury in fish Bay-wide, and, consequently, to meeting the targets of the Mercury TMDL.

#### 11.2. MARGIN OF SAFETY

TMDL analyses must incorporate a margin of safety to address scientific uncertainty and account for gaps in knowledge concerning the relationship between load and wasteload allocations and water quality. The Bay Mercury TMDL's targets and allocations rely on conservative assumptions about the relationship between total mercury inputs to the Bay and methylation potential. Although the water quality objectives and the Bay Mercury TMDL are written in terms of total mercury, it was assumed that all of total mercury is composed of MeHg, which are more significant to mercury concentrations in fish. This is because the ultimate goal of the TMDL is to reduce MeHg in fish tissue, thereby protecting the health of organisms that consume fish, including people. Ideally, a ratio of MeHg to total mercury could be used as a basis for the margin of safety. However, in the absence of such ratio, the conservative assumption about the amount of methylmercury provides an adequate margin of safety. An adaptive approach to implementation provides an additional margin of safety.

#### 11.3. SEASONAL VARIATIONS AND CRITICAL CONDITIONS

Analyzing temporal patterns in water quality data helps identify critical conditions, that is, the times when the greatest deviations from the water quality objectives are likely to occur.

Mercury loads, especially tributary inputs, fluctuate because of seasonal and inter-annual variations. Winter precipitation increases sediment and total Hg inputs to the Bay through erosion, runoff and re-suspension of sediments. Most of the total Hg coming from tributaries and direct surface runoff enters the Bay during high flow events, and greater total Hg and MeHg loads are generated during wet water years. In contrast, in-situ MeHg production is typically higher during the summer months. Seasonal variations and critical conditions were considered specifically in the context of bioaccumulation and risk to wildlife. Numeric targets for prey fish reflect the bird breeding season, when birds are most sensitive to methylmercury.

In addition, seasonal and inter-annual variability in Hg loads were accounted for in the source analysis and load allocations by evaluating long-term averages of annual loads for San Francisco Bay sources and losses. Also, Implementation Plan for the Bay Mercury

TMDL, acknowledges and accommodates long-term inter-annual variability by evaluating whether sources are meeting allocations on a multi-year basis, which helps average out differences among high and low rainfall years. Potential increases in MeHg production due to activities at the managed wetlands are also considered in the proposed TMDL for low DO/organic enrichment. The monitoring programs accommodate long-term inter-annual variability by evaluating whether sources are meeting allocations on a multi-year basis.

Extending the mercury objectives to Suisun Marsh will help ensure that any increase in MeHg production due to activities at the managed wetlands will be considered in implementation of the TMDL.

#### 11.4. **ATTAINMENT OF WATER QUALITY OBJECTIVES**

Although the load reductions required by the Bay Mercury TMDL are likely to be achieved by 2026, it may take as long as 100 years to achieve target concentrations in sport fish tissue. This is because the large inventory of mercury already in the Bay and the surrounding watersheds will continue to methylate, bioaccumulate, and cycle through the food chain.

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## 12. SUISUN MARSH DO TMDL IMPLEMENTATION PLAN

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TMDL implementation plans specify management actions that may be necessary to attain compliance with a TMDL's allocations and, ultimately, restore water quality and beneficial uses. Successful implementation plans typically rely on an integrated, adaptive management approach to utilize available resources effectively and efficiently. Adaptive implementation simultaneously makes progress toward achieving water quality standards through implementing actions, while relying on monitoring and special studies to reduce uncertainty and refine future management decisions.

Suisun Marsh periodically experiences low dissolved oxygen (DO) events, which primarily occur in the smaller tidal sloughs located in the western part of the marsh furthest from Suisun Bay. Water and vegetation management at managed wetlands (duck clubs) may result in direct impacts to water quality when water is discharged from the managed wetlands into marsh sloughs. Specifically, managed wetland operations can contribute to low dissolved oxygen conditions and organic enrichment, as well as increases of mercury methylation potential. However, conditions in the marsh are complex and water quality can be also affected by management actions to improve water supply reliability, increase freshwater flows through the Delta, and to restore wetland habitat. Both anthropogenic and natural factors affect water quality, and not all factors may be controllable to the same degree by particular implementation actions. Thus, it is important to identify those actions that are more likely to be accomplished and effective. In developing the proposed implementation actions priority was given to those that were lower-cost and could be completed on-site now at managed wetlands.

This Plan focuses on three general implementation categories:

1. Actions to control sources of low DO and mercury at managed wetlands;
2. Actions to control sources of low DO and mercury originating locally and outside the marsh;
3. Actions resulting from Estuary-wide plans and policies.

In addition, the Plan outlines how the proposed implementation actions will reduce mercury risks in consumers of fish, and monitoring needed to measure progress towards attainment of numeric targets and water quality objectives. The Plan's adaptive implementation section describes methods for evaluating and adapting the TMDL as we obtain new information. Table 12-1 shows the general elements of the Implementation Plan and Table 12-2 lists the recommended best management practices (BMPs) for achieving the water quality objectives for DO in Suisun Marsh, and specifically in the western portion of the marsh, where exceedances of water quality objectives are most frequent. For detailed description of the BMPs, their expected efficiency and water quality outcomes see [Siegel et al. \(2011\)](#).

## 12.1. IMPLEMENTATION ACTIONS AT MANAGED WETLANDS

### **12.1.1 Changes in Vegetation and Water Management at Managed Wetlands**

As discussed in Sections 3 and 6, vegetation and water management at managed wetlands result in periodic discharges to marsh sloughs that carry large loads of organic material and are low in DO. A study conducted in the marsh from 2007 to 2008 identified the key processes impacting water quality and a range of BMPs expected to reduce the occurrence of DO sags, and prevent mercury methylation. (Siegel et al. 2011, Gillenwater et al. 2013). Two general categories of BMPs were recommended:

1. Hydrology Management BMPs: This category of BMPs modifies the management of duck club or slough hydrology to (a) reduce or prevent conditions that may produce low DO events, (b) restrict the amount of low DO water discharged from multiple clubs at any one time, (c) discharge water to larger, well-mixed sloughs more capable of assimilating and dispersing low DO water, and (d) change the hydrology of the receiving sloughs to improve their capacity to assimilate and disperse low DO water.
2. Carbon (Vegetation and Soil) Management BMPs: This category of BMPs reduces the amount of labile (with the most rapid turnover times) organic carbon present on the managed wetlands, which fuels formation of low DO conditions, by: (a) managing vegetation type, (b) eliminating or changing the schedule of mowing activities, (c) removing mowed vegetation so that it does not decompose in the ponded water, and (d) reducing soil disturbance (disking).

To be effective, BMP implementation to address low DO issues in the marsh must be coordinated at the individual slough level and involve all or most of the managed wetlands that discharge to the slough. Different sloughs will require different BMP strategies due to variations in slough hydrology, watershed characteristics, managed wetland characteristics and property infrastructure, the amount and location of tidal marsh along the slough system, and other infrastructure considerations. Certain marsh sloughs are more likely to experience low DO conditions. Sloughs at greater risk should be prioritized for more intensive water quality improvement measures. As part of the proposed TMDL, Gillenwater et al. (2013) used an index approach to identify geographic sub-areas in the marsh where the specific application of individual BMPs is likely to result in lessening the overall organic enrichment-low DO problem. The index assessment shows that implementing BMPs in the back-end sloughs in the west part of the marsh will provide the most water quality benefits because these sloughs have the least circulation and flushing.

During TMDL development, Water Board staff coordinated with the Suisun Resource Conservation District (SRCD) to initiate early implementation actions in the marsh, targeting the most affected sloughs (Table 12-2). In particular, the Water Board added conditions requiring both BMP implementation and DO monitoring in sloughs as part of the 2013 Clean Water Act Section 401 water quality certification for the US Army Corps of Engineers Regional General Permit 3 (RGP3), a 5-year permit that authorizes managed wetland operation and maintenance activities, including levee stability improvements and maintenance of water control facilities and structures in the marsh.

Most RGP3-covered activities, such as levee repairs and managed wetlands operations and maintenance activities, are conducted by individual duck clubs and coordinated by SRCD, the California Department of Fish and Wildlife (DFW), the California Department of Water Resources (DWR), and the US Bureau of Reclamation (USBR). SRCD also provides Marsh landowners with technical assistance in water control and habitat management. Early implementation continued throughout the 5-year permit term (2013-2017), which resulted in the improved water quality conditions and significantly reduced frequency of low DO. There have not been any documented fish kills since RGP3 was renewed.

The west portion of the marsh was targeted for this early implementation. The duck clubs there, with support from SRCD, have already voluntarily implemented a range of the BMPs, including the following:

- Used DO measurements to coordinate flood-up and drain events across multiple managed wetlands;
- Staggered flood-up and discharges across multiple duck clubs to avoid simultaneous discharges of low DO water to a particular slough or sloughs;
- Modified intake and discharge points to enhance water mixing in receiving sloughs;
- Cleaned and removed sediment from swales and ditches to improve internal water circulation;
- Circulated water through the managed wetlands more quickly to reduce organic enrichment;
- Maximized use of discharge from the FSSD outfall for initial flood-up of managed wetlands close to the outfall to provide higher DO inflows;
- Completed vegetation management earlier to facilitate longer decomposition prior to fall flooding, reducing organic enrichment in discharged water;
- Mechanically removed broadleaf vegetation and promoted annual grasses; and
- Coordinated water management activities at duck clubs with vector control requirements and the constraints imposed by DFW and the U.S.FWS. Specifically, coordinated diversion and intake restrictions to avoid entrainment of listed species.

The 401 Water Quality Certification for Regional General Permit 3, issued on February 14, 2018, (2018 Water Quality Certification) implements the TMDL by requiring applicants to employ water management and vegetation BMPs identified in (1) the 2007 Conceptual Model for Managed Wetlands in Suisun Marsh; (2) the 2011 Strategies for Resolving Low Oxygen and Methylmercury Events in Northern Suisun Marsh; (3) the ongoing U.S. EPA Water Quality Improvement Pilot Project; and (4) the TMDL Staff Report. Applicants are required both to describe implemented actions and the effectiveness of BMPs and to report DO monitoring results in annual reports to the Water Board.

The 2018 Water Quality Certification also requires the Goodyear Slough Outfall to be cleaned as often as necessary to maintain dissolved oxygen objectives (as determined by continuous monitoring) and no less frequently than once per year.

In addition to BMP implementation, the RGP3 authorizes the cleaning of interior ditches used for water circulation, including the Goodyear Slough outfall managed by DWR. Maintaining good flow circulation in Goodyear Slough is essential to improving DO conditions in the west portion of the marsh. DWR was responsible for conducting the cleaning of the outfall as often as necessary to maintain water circulation, and specifically should inspect and clean the outfall before the fall floodup begins at the managed wetlands. Maintaining good flow circulation in Goodyear Slough is essential to improving DO conditions in the entire Goodyear Slough complex, and will also be included in the next reissuance of the 401 certification for RGP3 activities.

#### **12.1.2 DO Monitoring to Aid BMPs Implementation**

The 401 certification for RGP 3 also requires SRCD and Marsh landowners, together with other agencies, to conduct DO monitoring in west portion of the marsh. DO monitoring starts before managed wetlands begin discharging water to sloughs and continues until mid-November, when, in general, water quality starts to improve in the sloughs receiving discharge from managed wetlands. Each year, SRCD submits to the Water Board a monitoring report describing the the results of DO monitoring, the BMPs implemented during the fall discharge period, and co-ordination details among adjacent duck clubs. The monitoring proved to be valuable in assessing the effectiveness of various BMPs and in focusing implementation in low-DO areas. Thus, reissuing the monitoring provisions will be a key implementation action of the current TMDL.

The DO monitoring completed so far was used to track and adjust the discharge schedules for selected duck clubs. For example, in order to reduce potential impacts to Boyton and Peytonia Sloughs, SRCD created a schedule of flood and drain times to stagger releases from the managed wetlands to those sloughs. In fall 2013-15, monitoring showed substantially improved DO conditions compared to previous years. While DO concentrations in the most affected sloughs still dropped after the discharge started, the frequency, magnitude, and duration of DO sags decreased, suggesting that early implementation actions helped reduce DO impairment. Accordingly, the TMDL anticipates that implementation actions and monitoring should be continued, with some consideration for adaptive implementation based on the results of the monitoring.

**Table 12-1**  
**Summary of RGP3 implementation actions to meet DO objectives in Suisun Marsh sloughs**

<b>Action</b>	<b>Implementing Party</b>	<b>Timeframe</b>
Participate in ongoing SRCD-led actions to manage and coordinate discharges into the sloughs	Landowners and land managers of managed wetlands	Ongoing
Implement on-site measures to reduce formation and discharge of low DO waters	Landowners and land managers of managed wetlands	Ongoing
Report on implementation progress of BMPs intended to prevent excessive loading of DO/organic enrichment/nutrients to the sloughs	Landowners and land managers of managed wetlands	Ongoing (annually)
Coordinate maintenance activities at the managed wetlands to prevent adverse water quality impacts	SRCD, DFW, DWR, and the USBR	Ongoing
Implement measures to ensure that water quality in marsh sloughs is protected and meets applicable	SRCD, DFW, DWR, and the	Ongoing

Action	Implementing Party	Timeframe
water quality objectives (e.g. regular maintenance and cleanup of the Goodyear Slough outfall by DWR)	USBR	
Conduct DO monitoring to assess the effectiveness of the implementation measures and document improvement in water quality conditions	Landowners, SRCD, DFW, DWR, and the USBR	Ongoing (fall monitoring)

Table 12-2

**Recommended best management practices to improve water quality at managed wetlands**

Best Management Practices (BMPs)	Intended Outcomes <sup>1</sup>
<b>Water Management-Based BMPs: Initial Fall Flood-Up Period</b>	
Pre-flood to shoot level, drain, immediate re-flood	Minimize initial residence time and improve DO
Pre-flood to field saturation level, drain, delayed re-flood	Improve DO
Pre-flood to field saturation level, drain, immediate re-flood	Minimize initial residence time and improve DO
Flood and hold with minimum exchange	Avoid poor WQ discharges to sloughs during sensitive periods
Delay flood-up as late as possible before hunt season	Initial flood up occurs at cooler temperatures
Reroute wetland drain events to large sloughs	Reduce BOD loading to sloughs with lower DO capacity
Stagger flood/drain events across multiple wetlands	Avoid cumulative effect of multiple low-DO discharges; spread out low DO discharges temporally
Coordinate drain events across multiple wetlands using DO- based discharge scheduling	Avoid cumulative effect of multiple low-DO discharges; base operational decisions on real-time data of slough water quality
Maximize use of FSSD water for initial flood up	Provide higher DO wetland inflows, reduce upstream slough flows
Maximize FSSD water discharge into Boynton and/or Peytonia sloughs during drain events	Dilute low DO/high DOC water in Boynton, minimize net upstream flow
<b>Water Management-Based BMPs: Circulation Period (winter, hunting season)</b>	
Minimize exchange between wetlands and sloughs	Avoid low DO discharges, allow photo-demethylation and wind mixing
Exchange water between wetlands and sloughs frequently	Minimize residence time in wetlands to avoid anoxic conditions and methylation
Maximize internal wetland circulation	Eliminate stagnant areas with low DO
<b>Vegetation and Soil Management-Based BMPs</b>	



Best Management Practices (BMPs)	Intended Outcomes <sup>1</sup>
Manage for wetland plants less leafy greens	Reduce labile organic matter
Mow vegetation earlier in the season	Allow longer vegetation decomposition period to improve DO conditions in discharges
Remove mowed vegetation from wetlands	Reduce labile organic matter from dead vegetation
Graze wetlands to remove unwanted vegetation	Reduce labile organic matter from dead vegetation
Reduce soil disturbance (disking) activities	Reduce soil organic matter content available for decomposition

<sup>1</sup> For detailed description of the BMPs, their expected efficiency and water quality outcomes see [Siegel et al. \(2011\)](#).

### 12.1.3 Funding Opportunities and Special Projects

Limited infrastructure, lack of electricity in the field, and inadequate funding by landowners may impede improvements to water management at duck clubs. Infrastructure to manage wetlands can include gates, pipes, flashboard risers, and pumps, as well as the ditch system that circulates flood water through the wetland. Upgrades to water control structures and related infrastructure (e.g. intake pipe screening), changes to the intensity of vegetation management, and changes to ditch maintenance, such as periodic excavation of material in internal ditches to improve circulation, could require expenses that some land owners may not be able to afford. Other options, such as installation of pumps, may be limited by limits to available power at the duck clubs.

Four available funding sources, described below, may help meet these needs. We are supportive of efforts by dischargers and other interested parties to seek funding for pilot-scale testing and full implementation of expanded BMPs and other changes, such as landscape modifications, changes to ongoing operations and infrastructure, and monitoring to support implementation of the TMDL. These include:

- Federal Environmental Quality Incentives Program (EQIP);
- Suisun Marsh Preservation Agreement Implementation Fund (SMPA PAI Fund),
- Water Quality, Supply, and Infrastructure Improvement Act (Proposition 1) Grant, and
- U.S. EPA Grants.

#### EQIP

EQIP, administered by the Natural Resource Conservation Service (NRCS), is a potential funding source to help landowners pay for BMP implementation. The EQIP program provides financial and technical assistance to land managers to help plan and implement conservation practices that address natural resource concerns, and for opportunities to improve soil, water, plant, animal, and related resources on agricultural land and non-industrial private forest land.

**SMPA PAI Fund**

The SMPA PAI Fund, established as part of the Suisun Marsh Habitat Management, Preservation, and Restoration Plan, provides cost share for eligible activities in managed wetlands that mitigate for the impacts of the Central Valley Project and State Water Project. Activities eligible for PAI funding include: improvements to managed wetland facilities, improvements in operational efficiency and water management capabilities. Such improvements align well with the implementation actions proposed in this TMDL.

**Proposition 1 Grants**

The Proposition 1 grant program provides funding to meet the California Water Action Plan objectives of more reliable water supplies, restoration of important species and habitat, and more resilient, sustainably managed water resources system that can better withstand inevitable and unforeseen pressures in the coming decades. Beginning in 2015, this grant program has funded more than \$85 million in projects that will benefit the Delta over a 10-year period. The Delta Conservancy administers the Proposition 1 Ecosystem Restoration and Water Quality Grant Program, which funds planning and/or implementation projects with the objective to protect, restore, and enhance ecosystem functions, and improve water management practices to advance water quality in waterways.

**EPA Grant Programs**

The U.S. EPA has at least two grant programs that may be well-suited to pilot scale BMP implementation. The San Francisco Bay Area *Water Quality Improvement Fund (SFBWQIF)* has, since 2008, provided grants of approximately \$800,000 to \$1 million that can be used over a period of up to four years for activities that enhance aquatic habitat, and protect and restore the water quality of the San Francisco Bay and its watersheds. The SFBWQIF has invested over \$44 million in 61 projects through 36 grant awards in the Bay Area to date. A project funded under this grant program is currently underway in Suisun Marsh (see section 12.1.2 below).

The federal *Clean Water Act Section 319(h)* grant program is a federally-funded nonpoint source pollution control program administered in California by the State Water Board. This program funds projects that will control non-point source discharges that impair beneficial uses and limit the effects of pollutants in those discharges. Grant applicants compete in a statewide selection process in which proposed projects are reviewed by a panel of State Water Board, Regional Water Board, and U.S. EPA staff. Funds for each project range from \$250,000 to \$800,000, and the applicant must fund at least 25% of the project. This grant program could fund projects that supplement early implementation funded by the U.S. EPA WQIF, and to continue ongoing efforts to implement the DO TMDL requirements in Suisun Marsh. The preliminary findings of the current study in the marsh indicate that real-time DO tracking would improve the coordination of flooding and discharging activities, and, as a result, would help prevent acute drops in slough DO. Instantaneous access to DO data measured at strategic locations in the west Marsh would provide a much-needed warning system about worsening DO conditions, and help with more effective deployment of BMPs. We support efforts to install a DO monitoring telemetry system and use of predictive models to aid water quality management at managed wetlands, and to provide regulatory feedback.

#### **12.1.4 WQIF Project 2016-2018**

During development of this TMDL, SRCD obtained U.S. EPA WQIF funding to implement a planning project in partnership with CDFW, FSSD, Delta Conservancy and others, and with support from the Water Board. The goals of this project are to:

- identify constraints, opportunities and recommendations for BMPs in Suisun Marsh that could improve water quality relative to DO and MeHg;
- build knowledge within the managed wetland landowner community, and
- develop working relationships between all stakeholders to support attaining long-term TMDL objectives.

The project continues to provide a framework for implementation of the Suisun Marsh DO TMDL, and promotes successful actions and relationships that support attaining long-term TMDL objectives. Expected environmental outcomes are reduced occurrences of low DO and MeHg production in tidal sloughs as described in Siegel et al. (2011). The project funding extends from 2016 through 2018 and information learned through the project will inform the feasibility of attainment of the TMDL and adaptive implementation.

#### **12.1.5 Restoration of Managed Wetlands to Tidal Marsh**

Suisun Marsh is targeted for extensive future tidal wetland restoration to improve water quality and ecosystem values (SMP 2014). There is evidence to suggest that the quality of water discharged from tidal wetlands is better than that from managed wetlands (Tetra Tech 2013b). This is because tidal wetlands have better circulation and shorter residence times than managed wetlands. Restoration of managed wetlands to tidal marsh, therefore, offers a means of minimizing or avoiding generation of low DO waters. Tidal restoration also alters the hydrology of the tidal sloughs to which sites are connected, leading to an increase in tidal mixing throughout the slough/wetland system, which again leads to improved water quality conditions. However, tidal wetlands could trigger mercury transformations and contribute to temporary increase in loading of mercury into adjacent sloughs.

The restoration of the 70-acre Blacklock site in northeast Suisun Marsh provides an opportunity to study the impact of the restoration on DO and mercury cycling. The project converted a diked, managed wetland with limited seasonal water exchange with Nurse Slough to tidal marsh with unrestricted daily tidal inundations. Monitoring and studies estimating changes in mercury cycling after conversion to tidal marsh are ongoing at Blacklock. The data from these studies will be used to abate potential adverse mercury effects and aid future restoration efforts in other parts of the marsh.

The Bay Mercury TMDL also recognizes that wetlands may contribute substantially to methylmercury production and biological exposure to mercury within the Bay and requires implementation tasks to ensure that restored wetlands are designed to minimize methylmercury production and subsequent transfer to the food web.

Large-scale restoration efforts in the marsh and the Sacramento-San Joaquin River Delta (Delta) are further discussed under Estuary-Wide Implementation Actions.

### **12.1.6 Waste Discharge Requirements**

The primary regulatory tool to implement the TMDL at both managed and restored wetlands is the 401 certification issued in support of the USACE's RGP3. However the Regional Board may also issue individual Waste Discharge Requirements (WDRs) under section 13263(a) of the Water Code to individual landowners if the TMDL is not achieved via voluntary collaboration amongst landowners and compliance with the 401 certification.

Such WDRs and Section 401 water quality certifications must, at a minimum, include provisions to minimize methylmercury production and biological uptake, and result in no net increase in mercury or methylmercury loads to the Bay. Restoration projects must also include pre- and post-restoration monitoring to demonstrate compliance and to collect information that will inform future management decisions. This information will be adaptively incorporated into the implementation plan as it becomes available.

## **12.2. IMPLEMENTATION ACTIONS FOR SOURCES OTHER THAN MANAGED WETLANDS**

Municipal and stormwater discharges contribute pollutants, including mercury, into the marsh sloughs, and are a potential conveyer of other pollutants that may affect DO (e.g., nutrients). This TMDL does not require new implementation actions because the existing regulatory programs for municipal stormwater runoff and municipal wastewater are in place, and will continue to address these other pollutants and dissolved oxygen.

### **12.2.1 Municipal Wastewater**

#### **Fairfield Suisun Sewer District**

The wasteload allocation for FSSD will be implemented through the facility's NPDES permit (CA0038024), which already has receiving water limitations for DO and numeric effluent limits for biological oxygen demand and nutrients. The current permit specifies that the receiving water limitations have to be met in Boyton Slough and LedgeWood Creek and identifies monitoring locations to demonstrate compliance. These locations may change in the future. The permit also requires implementation of BMPs to maintain optimal treatment performance and monitoring to identify and manage controllable sources of pollutants that affect DO.

FSSD's effluent data show that 1,461 measurements out of 1,463 (99.9 percent) were  $\geq 5.0$  mg/L, and 1,131 (77 percent) were  $\geq 7.0$  mg/L (evaluated for the permit reissuance in 2015). Because FSSD already provides advanced secondary treatment, and its wastewater has high DO concentrations greater than those in the receiving waters, the requirements of the facility's NPDES permit are not expected to change to implement the TMDL. The wasteload allocation for the FSSD wastewater treatment plant will continue to be implemented as receiving water limitations ( $\geq 5.0$  mg/L June 1-November 15, and  $\geq 7.0$  mg/L during all other times of the year and expressed as 30-day running average and within one foot of the surface). Staff will recommend to the Water Board that the requirement to maintain the median DO concentration for any three consecutive months at  $\geq 80\%$  of DO content at saturation not be required as this objective does not apply. FSSD's receiving water monitoring of nutrients, pH, hardness, temperature, salinity, and DO help track water quality in the receiving sloughs and will provide information to refine effluent limits in future permits. FSSD also collected nutrient data for effluent

characterization required by a 13267 letter issued by the Water Board on March 2, 2012. At the next reissuance, the TMDL requirements will be included in the conditions of the reissued NPDES permit for FSSD.

Since FSSD effluent has high DO levels, routing more FSSD discharge to Boynton and Peytonia sloughs would improve DO conditions by providing flushing flows and high DO water at times when low DO water is being discharged from managed wetlands. Additionally, treated wastewater can be used directly to flood up duck clubs located in the immediate vicinity of the discharge pipeline. This would reduce the amount of water drawn from the sloughs, thereby reducing net upstream flows that had been associated with fish kills in the past. FSSD currently participates in the WQIF project, which tests the best ways to utilize treated effluent from its facility to improve DO conditions in the marsh.

#### **Mercury Watershed Permit**

Discharges of mercury from FSSD are regulated by the Mercury Watershed Permit (Order No. R2-2017-0041), which implements the San Francisco Bay Mercury TMDL wasteload allocations for industrial and municipal wastewater discharges. The numeric effluent limits, trigger actions, and other compliance requirements in FSSD's NPDES wastewater permit reflect the targets established by the Bay Mercury TMDL, which are the same as the targets proposed for Suisun Marsh. Accordingly, extension of the Bay Mercury TMDL to Suisun Marsh would not necessitate any changes to the Watershed Permit or to the implementation actions required by FSSD under that permit.

#### **12.2.2 Municipal Stormwater Runoff**

Runoff from adjacent watersheds has been identified as a potential source of organic material and nutrients, and a potential conveyer of mercury. Actions necessary to control stormwater pollution, including actions specifically designed to control mercury discharges, are implemented through the requirements included in the Municipal Regional Stormwater NPDES permit (MRP) (Order No. R2-2015-0049). No new requirements are necessary to implement the DO TMDL. Because mercury-related requirements in the MRP are already designed to comply with the San Francisco Bay Mercury TMDL and the site-specific water quality objectives established by that TMDL, no new actions are required to attain the mercury objectives proposed for Suisun Marsh. However, a brief description of relevant stormwater controls from the MRP, which will help control both DO and mercury, appears below:

MRP permittees, including the City of Fairfield and the City of Suisun City, are responsible for implementing control measures needed to prevent or reduce pollutants in stormwater and for funding the capital, operation, and maintenance expenditures necessary to implement such measures. Both general and pollutant-specific control measures will help to achieve compliance with this TMDL.

The MRP identifies the need for collecting information on pollutants of concern in receiving waters, which include DO, nutrients, mercury and ancillary parameters such as total organic carbon in order to identify pollutant sources, loads, trends and to evaluate the effectiveness or impacts of existing management actions.

Mercury-related actions are found in section C.11 of Order No. R2-2015-0049. These actions include implementation of pollution prevention, source control, stormwater treatment, and risk reduction measures; construction of green infrastructure projects; and assessment of load reductions of mercury. In addition, MRP permittees are required to develop TMDL implementation plans demonstrating that they will comply with the Bay Mercury TMDL load allocations by 2028. MRP permittees are also required to conduct monitoring. The municipal stormwater program generates water quality data that are designed to estimate loads of mercury and other contaminants from local tributaries and stormwater conveyances, track these loads over time, and assess the success of control measures in reducing mercury discharges.

Moreover, section C.1 of the MRP, in part, states that when discharges are causing or contributing to an exceedance of the applicable water quality standard, MRP permittee(s) shall submit a report to the Water Board that describes the BMPs being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants causing or contributing to the exceedance.

The actions already implemented through MRP requirements are expected to continue to improve water quality in streams discharging to Suisun Marsh and in the marsh sloughs.

### **12.2.3 Mercury Loading from San Francisco Bay and the Sacramento-San Joaquin River Delta**

Implementation actions already required by the San Francisco Bay Mercury TMDL and the methylmercury TMDL in the Delta are helping to address local and estuary-wide mercury impairment, which is caused by mercury loads from historic mining, atmospheric deposition, and active municipal and industrial sources. Allocations, management techniques, and control strategies already required by the existing mercury TMDLs will, over time, contribute to the overall improvement of water quality conditions in the Bay and in the marsh. The major requirements called for in the Bay Mercury TMDL, which directly contribute to meeting the targets in Suisun Marsh include actions to:

- Reduce mercury loads to achieve the average total mercury reduction of 500 kg/year;
- Reduce methylmercury production and consequent risk to humans and wildlife exposed to methylmercury;
- Investigate ways to address public health impacts of mercury in San Francisco Bay/Delta fish including activities that reduce actual and potential exposure of and mitigate health impacts to those people and communities most likely to be affected by mercury;
- Conduct monitoring and focused studies to track progress and improve the scientific understanding of the system and to evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;
- Encourage actions that address multiple pollutants.

### 12.3. ESTUARY–WIDE IMPLEMENTATION ACTIONS

Driven by Cal WaterFix and the need for climate change resiliency, large-scale wetland ecosystem restoration projects in various areas of the Estuary, including Suisun Marsh, are in the planning stages. Several regional ecosystem planning efforts call for extensive additional restoration in the decades to come, including the Suisun Marsh Habitat Management, Preservation, and Restoration Plan (SMP), Bay Delta Conservation Plan, Bay-Delta Plan, Delta Plan, and others. These planning efforts may ultimately result in the restoration of tidal action to up to 65,000 - 100,000 acres of land. Tidal marsh restoration, together with improvements in freshwater inflows, is expected to result in a better and more diverse ecosystem, which in turn will contribute to long-term improvements in water quality, including DO conditions in Suisun Marsh. In the process, short-term localized and system-wide random changes in DO may also occur. The scope and progress of the current restoration planning efforts are summarized below:

#### *Suisun Marsh Habitat Management, Preservation, and Restoration Plan (SMP)*

The SMP, established in 2014, is a comprehensive 30-year plan designed to address the use of resources within the wetland and upland habitats in the marsh, resolve permitting issues related to ongoing and future maintenance and management activities, and balance the benefits of tidal wetland restoration with other uses in the marsh. The principals agencies involved in developing and implementation of the SMP are U.S. FWS, U.S. Department of the Interior, Bureau of Reclamation, CDFW, NMFS, and SRCD. The SMP advocates actions to improve DO concentrations in managed wetlands by eliminating or reducing discharges to smaller sloughs, increasing circulation, changing vegetation cover or implementing rapid flooding and drainage to improve aeration. All of these actions have been demonstrated to help alleviate low DO conditions in the receiving sloughs. The planned conversion of managed wetlands to tidal wetlands and increased tidal flows are expected to have a beneficial impact on water quality because it would increase levels of DO and improve overall water quality in Marsh sloughs. Over the 30-year SMP implementation period, up to 7,000 acres of diked/managed wetlands will be restored to tidal wetlands. The SMP EIS/EIR (2014) programmatically evaluates any impacts resulting from managed wetland activities and the conversion of managed wetlands to tidal habitat. The EIS/EIR also provides a detailed analysis of baseline conditions and environmental commitments and mitigation measures necessary to ensure that resources are protected and that restoration and managed wetland goals are met simultaneously.

The main goals of the SMP include:

- Preservation and enhancement of managed seasonal wetlands;
- Implementation of a comprehensive levee protection and improvement program; and
- Protection of ecosystem and drinking water quality, while restoring habitat for tidal marsh-dependent sensitive species.

*Bay Delta Conservation Plan (BDCP)*

As currently proposed, the BDCP establishes a framework for ecosystem restoration across the legal Delta and Suisun Marsh. It aims to create or restore a mosaic of natural communities that would be adaptable to changing conditions, sea level rise, increase native biodiversity, improve linkages between habitats, and allow natural flooding and tidal circulation to promote the regeneration of vegetation and improve water quality. It currently targets protection of at least 31,000 acres of existing natural communities and restoration or creation of more than 72,000 acres of natural communities, including at least 65,000 acres of tidally influenced wetlands. In addition, the BDCP intends to improve the Delta and Marsh ecosystems by taking actions such as:

- Protect and improve habitat linkages to promote the movement of native species;
- Prepare for future sea level rise by providing transitional areas that allow future upslope establishment of tidal wetlands;
- Allow natural flooding to promote the regeneration of vegetation and related ecosystem processes;
- Connect rivers and their floodplains to recharge groundwater, provide fish spawning and rearing habitat, and increase food supply;
- Manage the distribution and abundance of nonnative predators to reduce predation on native special-status species.

Actions advocated by BDCP, and in particular, the tidal wetland restoration, is expected to have a beneficial impact on water quality because it would increase levels of DO and improve overall water quality in Marsh sloughs.

*Bay-Delta Water Quality Control Plan (Bay-Delta Plan)*

The State Water Board is updating its Bay-Delta Plan, which will set water quality objectives for south Delta agriculture, and San Joaquin River flow objectives to protect fish and wildlife in the entire Estuary, and, eventually, Delta outflow objectives, Sacramento River flow objectives, Suisun Marsh salinity objectives, and potential new floodplain habitat flow objectives. The Bay-Delta Plan provides a framework for managing Suisun Marsh resources to protect the public trust and fish and wildlife beneficial uses; regulate, manage, and study pollutants in Suisun Marsh; and address development around Suisun Marsh to minimize impacts to beneficial uses and improve water quality.

*Delta Plan*

The Delta Plan is a long-term management plan required by the 2009 Delta Reform Act. It builds on work by DWR, DFW, and the State Water Board and encompasses water use, flood management, and habitat restoration, with a specific focus on the legal Delta and Marsh. It calls for protection, restoration, and enhancement of the ecosystem by designating six high priority locations in the Delta and Suisun Marsh to recover endangered species and rebuild salmon runs. The Delta Plan also prioritizes actions to reduce pollution, ensure improved water quality, and limit invasive species, while moving to establish a more natural pattern of water flows in the Delta, all of which will



contribute to improvement of DO conditions. The Marsh is one of the Delta Plan's priority habitat restoration areas. In addition, the Delta Plan calls for coordination of efforts to implement requirements of the Bay Mercury and Delta methylmercury TMDLs. Parties identified as responsible for current methylmercury loads or proponents of projects that may increase methylmercury loading in the Delta or Suisun Marsh should participate in control studies or implement site-specific study plans that evaluate practices to minimize methylmercury discharges.

## 12.4. MONITORING AND COMPLIANCE

### ***12.4.1 Mercury Monitoring to Protect Human Health and Wildlife***

Considerations for compliance monitoring for the human health target of the TMDL include: extent of local angling and use for human consumption, species abundance in popular fishing areas, and factors such as sport fish trophic position and diet, which influence the extent that fish will take up and bioaccumulate mercury. For use as indicators of mercury concentrations in a given area, site fidelity whether a given fish species remains in a local region, rather than migrate to other areas, is helpful. As discussed in Chapter 5, we propose that the human health target of 0.2 mg/kg apply to striped bass, the most common sport fish caught in Suisun Marsh. The mercury level should be expressed as an average wet weight concentration of total mercury in skinless fillets. This is consistent with the 0.2 mg/kg adopted in other Bay Area mercury TMDLs, including San Francisco Bay, Tomales Bay, Guadalupe River, and Sacramento–San Joaquin Delta. The Regional Monitoring Program (RMP) measures mercury (and many other contaminants) in water, sediment, and fish tissue collected at several locations around the Bay each year. The monitoring frequency and fish sample size in Suisun Marsh should follow the monitoring protocols developed by RMP for sampling fish in San Francisco Bay.

Considerations for compliance monitoring for the wildlife target of the TMDL include: the piscivorous species of birds and other wildlife present in the marsh, the type and size ranges of fish eaten, the extent that those fish bioaccumulate mercury, and the timing of bird species' critical life-stages. Protection of wildlife should be determined using Mississippi silversides, which is an important indicator of wildlife exposure to MeHg because the fish forages in shoreline marshes and shallow water habitats, which exhibit greater potential for Hg methylation. Mercury concentrations were sampled in silversides in the marsh in the past, which provides a useful data for comparison and tracking progress on how the concentrations in biota are changing over time.

### ***12.4.2 Current DO Monitoring to Protect Aquatic Life Beneficial Uses***

Suisun Resource Conservation District (SRCD) together with DFW, DWR, USBR, and the owners and land managers of Suisun Marsh duck clubs conduct water quality monitoring focused on DO conditions in the back-end sloughs, as required by the 401 certification issued by the Water Board on February 14, 2018. The 401 certification requires the sampling frequency and spatial extent to be sufficient to determine ambient DO levels before the discharge occurs and to determine whether water quality objectives for DO in the receiving waters are met after the release of water from the managed wetlands. In addition to DO data, monitoring reports submitted by the agencies on an

annual basis contain information on operation and maintenance activities at managed wetlands and the status of BMP implementation..

The Biological Opinion issued by the National Marine Fisheries Service on July 3, 2013, requires monitoring of DO concentrations during May, June and October in the western region of Suisun Marsh. This monitoring is conducted to assess the effects of drain water in receiving sloughs to ensure the continued existence and protection of the listed and sensitive species.

The Municipal Regional Stormwater Permit (MRP, Order No. R2-2015-0049) requires MRP permittees to collect information on pollutants of concern, including nutrients, mercury, DO and total organic carbon in order to identify pollutant sources, loads, trends and to evaluate the effectiveness or impacts of existing management actions. The cities of Fairfield and Suisun City conduct monitoring as required by the MRP. In particular, Provision C.8.d. calls for status creek monitoring to assess chemical, physical, and biological impacts of urban runoff on receiving waters in order to evaluate whether water quality in these streams meets all applicable numeric and narrative water quality objectives. Continuous monitoring of DO, temperature and pH is required because these parameters are fundamental to supporting aquatic life beneficial uses. The MRP specifies the reporting requirements and the monitoring frequency, duration and locations for individual MRP permittees.

#### ***12.4.3 Required Monitoring to Assess Compliance with DO Objectives and Meeting TMDL Targets***

Implementing parties, and specifically, entities named in the 401 certification for the RGP3 permit, including Marsh landowners represented by SRCD, and DFW, DWR and USBR, are collectively responsible for developing monitoring plans and conducting monitoring sufficient to assess compliance with the wasteload allocations, load allocations, and DO numeric objectives established for Suisun Marsh sloughs. At a minimum this monitoring should be conducted in the fall to inform management decisions. The monitoring should include appropriate sampling frequency and periods of data collection, and must be adequate to evaluate DO on daily basis as well as 30-day running averages. DO monitoring should also be conducted at established compliance points in order to evaluate whether they are achieving the load allocation and site-specific objectives. The results will be reported to the Water Board, including efforts to improve water quality, the BMPs implemented during the fall discharge period, and coordination details among adjacent managed wetlands, with a focus on efforts in the western Marsh.

The Water Board will collaborate with other agencies and Marsh landowners to identify opportunities to collect additional DO data in Suisun Marsh sloughs to enhance the understanding of DO variability, and the extent to which deviations from the DO objectives occur under natural and anthropogenic conditions. For example, DWR constructed several facilities in Suisun Marsh for the purpose of mitigating adverse impacts on Suisun salinity from the State Water Project and Central Valley Project, and maintains a network of monitoring sites for real-time, daily, and monthly measurements of salinity and other water quality parameters in a number of compliance and monitoring

stations throughout the marsh. We are working with DWR to furnish station S-35 in Goodyear Slough with a DO sensor to collect continuous data in this location. The additional DO data will supplement focused monitoring during the fall discharge, and advance understanding of the cumulative effects of BMP implementation on the conditions in the west Marsh.

Water quality monitoring conducted by National Estuarine Research Reserve (NERR) in the First and Second Mallard sloughs, which are minimally impacted tidal sloughs, was helpful in developing the site-specific objectives. Continued data collection by NERR will assist the Water Board in evaluating potential effects of climate on the marsh, and DO background conditions.

#### 12.5. ADAPTIVE IMPLEMENTATION

As new information becomes available through monitoring and evaluation, this Implementation Plan may be modified. Implementation of the management actions described here will be guided by feasibility, improved information, available funding, and site-specific conditions.

Accordingly, this TMDL will be implemented in phases starting with early implementation options and actions that are already being implemented under existing permits and through coordination among private and public entities. The information gained through the early implementation of BMPs at the managed wetlands in the western Marsh will be used to refine selection and deployment of BMPs in other areas of Suisun Marsh, if deemed necessary.

In particular, the DO monitoring required by the 401 certification and tools developed during the project funded by the U.S. EPA WQIF will improve our understanding of the natural and anthropogenic fluctuations in DO and better determine the conditions when impacts to fish are likely to occur. Interpretation of these data may result in improved ways to evaluate the compliance with the proposed DO objectives, and more focused deployment of BMPs.

The ongoing efforts to improve our understanding of the fate and transport of mercury in marsh environment will allow better predictions of MeHg production, which will guide tidal restoration and inform the need to adapt implementation schedules.

Further, the success of the DO and Hg TMDLs depends not only on actions implemented at managed wetlands, but to a large degree on Estuary-wide efforts. We will be assessing implementation progress and new data to determine if the quantity and quality of emerging information are sufficient to require changes to the implementation strategy. The need for special studies will be evaluated on the basis of new information collected throughout the marsh. As a result of adaptive management and monitoring, additional implementation of BMPs could be required in the west Marsh or elsewhere depending on implementation progress, or if water quality conditions decline in the eastern Marsh.

## 13. MINOR EDITS TO BASIN PLAN CHAPTERS 2 AND 3

Minor clarifications or corrections to Chapters 2 and 3 of the Basin Plan are proposed as part of this project. These editorial changes are intended to clarify or correct narrative passages or specific tables of the Basin Plan. These proposed non-regulatory edits do not affect or change any State or regional policy, program, or implementation plan. The types of revisions proposed, with rationale, are described below in Table 13-1. The specific changes, shown in underline-strikeout, can be found in the Basin Plan amendment.

**Table 13-1**  
**Miscellaneous editorial revisions to Basin Plan Chapters 2 and 3**

Location	Description of Edit
Section 2.2.1, 2.2.2	We corrected the abbreviation for Industrial Process Supply (PROC) to match the definition in the text of Chapter 2. The abbreviation was incorrectly given as PRO in these two locations.
Section 2.2.1, 2.2.2, and Tables 2-2 and 2-3	We corrected the abbreviation for Freshwater Replenishment (FRSH) to match the definition in the text of Chapter 2. In these two Chapter 2 sections and the headers for these two tables (and footnotes for Table 2-2), the abbreviation was incorrectly given as FRESH. All instances of this abbreviation were changed to "FRSH".
Section 2.2.2 and Table 2-2	We corrected typos in this section and table in which "Industrial Water Supply, Industrial process water supply, or Industrial service water supply" were given as the beneficial use names. "Industrial Process Supply" and "Industrial Service Supply" are the correct names.
Table 3-3	Footnotes b and f of Table 3-3 have been updated to note that Table 3-3A contains site-specific nickel water quality objectives for South San Francisco Bay and site-specific copper water quality objectives for all segments of San Francisco Bay.
Table 3-3	Footnote k on Table 3-3 does not currently have sufficient information about the derivation of the PAH objective. The required information was available in the 1986 version of the Basin Plan, but was accidentally dropped in subsequent versions. The original footnote has been restored and appended to the current footnote k of this table to provide explanatory context for the PAH objective.
Tables 3-3 and 3-4	We updated footnotes to Tables 3.3 and 3-4 to remove the citation of the draft criteria and cite U.S. EPA's final tributyltin criteria adopted in 2003.
Table 3-3A	We included a footnote 3 to Table 3-3A explaining that water effect ratios are already included in copper and nickel site-specific objectives as originally adopted and provided information about converting dissolved metal objectives to total metal concentrations. This is to eliminate confusion and clarify the meaning of the site-specific objectives.

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## 14. REGULATORY ANALYSES

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The proposed Basin Plan amendment establishes site-specific objectives (SSOs) for dissolved oxygen (DO) protective of aquatic life beneficial uses, and a TMDL for low DO/organic enrichment in Suisun Marsh. This section includes the analyses required by law for the adoption of new water quality objectives and for the proposed Basin Plan amendment. It provides an overview of the Project's compliance with California Water Code requirements; peer review requirements of Health and Safety Code §57004; federal and state anti-degradation policies; and with California Environmental Quality Act (CEQA).

The proposed amendment also makes non-regulatory revisions to Chapters 2 and 3 in the Basin Plan to improve clarity. Because these changes are solely a clarification of the Basin Plan, there are no potential significant environmental impacts or economic impacts associated with compliance with these revisions.

### 14.1. REGULATORY ANALYSES REQUIRED TO ESTABLISH NEW WATER QUALITY OBJECTIVES

For the proposed water quality objectives, this section contains the analyses required by the California Water Code (CWC §13241 and §13242), federal water quality criteria requirements (40 Code of Federal Regulations [CFR] §131.11), and state and federal anti-degradation requirements.

#### **14.1.1 Water Code Section §13241 Analysis**

Water Code section 13241 requires the Water Board to consider the following when establishing a water quality objective:

- a) Past, present, and probable future beneficial uses of water;
- b) Environmental characteristics of the hydrographic unit under consideration;
- c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;
- d) Economic considerations;
- e) Need for developing housing within the region, and
- f) Need to develop and use recycled water.

The following analysis demonstrates how section 13241 requirements were considered in establishing the proposed site-specific objectives for dissolved oxygen.

#### **Beneficial Uses**

The past, present, and probable beneficial uses of Suisun Marsh are estuarine habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact recreation, and non-contact water recreation (Table 2-1). In addition, the two largest sloughs in the marsh, Montezuma and Suisun sloughs, are designated as warm water fish habitat. The proposed new SSOs for DO reflect current scientific findings regarding the DO requirements of the most sensitive life stages of fish and other aquatic organisms. They have been developed using U.S. EPA-recommended

methodology, and adapted to incorporate information regarding fish present and site-specific conditions in Suisun Marsh. Since the SSOs were developed to be protective of the most sensitive beneficial uses, those relevant to aquatic life, the objectives are protective of all beneficial uses listed above.

### **Environmental Characteristics of the Hydrographic Unit**

The hydrographic unit is the whole of Suisun Marsh, but the objectives and the TMDL apply to the sloughs within the marsh as shown in Figure 2-1 and Figure 8-1. The environmental characteristics and existing conditions are discussed in Chapter 2 of this Staff Report. Chapter 4 discusses the rationale for refining the DO objectives and presents the site-specific environmental data, and steps taken to establish the SSOs for DO reflecting the fish species and conditions in the marsh.

### *Water Quality Conditions that Could Reasonably be Achieved*

The proposed water quality objectives reflect the desired water quality conditions in Suisun Marsh sloughs such that beneficial uses will not be adversely affected by low DO. Although the recommended SSOs are lower than the existing Basin Plan objectives, they better reflect natural patterns and range of daily DO fluctuations with temperature, salinity and pressure changes, based on currently available scientific information and available monitoring tools.

The objectives also take into account naturally-occurring organic enrichment in marshes and wetlands, which periodically leads to lower DO concentrations. The new objectives were derived according to methodology established by the U.S. EPA (2000) and result in scientifically-defensible objectives for DO. The method used to calculate the chronic levels of DO required to protect aquatic organisms in Suisun Marsh is described in Chapter 4. The proposed DO objectives have been peer reviewed by the Expert Panel to ensure that these objectives offer protection of biological communities and reflect the best scientific understanding of natural marsh conditions (Appendix D).

A water quality attainment strategy developed to support the proposed TMDL and SSOs (Chapter 12), and specifically the early implementation actions (Section 12.1), and ongoing activities at managed wetlands describe coordinated efforts to control factors that may affect water quality. The strategy includes actions at managed wetlands aimed at lowering the extent and frequency of low DO events in nearby sloughs and simultaneous monitoring to improve coordination of water releases from wetlands to verify that these efforts result in meeting the proposed water quality objectives and protection of beneficial uses.

### **Economic Considerations**

The proposed site-specific objectives for DO will be implemented through the Suisun Marsh TMDL. The goal of this analysis is to evaluate the costs of various implementation measures to improve habitat conditions for aquatic organisms and wildlife, and to minimize or avoid adverse effects of low DO concentrations in Suisun Marsh sloughs. This report's implementation section (Section 12) describes candidate implementation measures that may be used to control potential sources of low DO.

The discussion of economic considerations or costs associated with various measures described in the implementation section is limited to those actions that are currently technically feasible and reasonably likely to be implemented. The TMDL is not

prescriptive but rather provides implementing parties with a set of BMPs that could be tailored to the specific location, hydrologic conditions, or other needs. A subset of the candidate implementation measures listed in Table 12-2 is currently tested in the field as part of a project funded by the U.S. EPA's Water Quality Improvement Grant. When completed in 2018, the final recommendations of that project will provide additional information on the feasibility and costs of implementation.

Anticipating costs with precision is challenging for various reasons. Most of the actions to improve DO conditions rely on co-ordination of water management actions or might be part of the existing regulatory requirements. In addition, it should be noted that there are multiple additional benefits associated with the implementation of these strategies. These benefits include improving fish and wildlife habitat, supporting a better functioning ecosystem or enhancing recreational values of the marsh.

We consider the new costs of applying the TMDL measures to be relatively minor as most of the actions to improve DO conditions in the sloughs are either already required or are being currently implemented. To a significant extent, the proposed TMDL can be considered a tool to focus and facilitate implementation, and assist the Water Board with protection of water quality and meeting DO objectives in Suisun Marsh.

*Municipal discharges:* The FSSD is maintaining the optimal wastewater treatment for DO, and is currently meeting the DO targets set in the TMDL. We do not anticipate any additional costs resulting from the implementation of the TMDL other than incidental increases associated with identifying and managing controllable sources of pollutants in their service area, which may affect the receiving water quality. There could be some new costs associated with conducting or causing to conduct monitoring of water quality if conditions change.

*Watershed and urban runoff:* As discussed in Section 12.2.2, urban storm water runoff from Fairfield and Suisun City are regulated under conditions in the Municipal Regional Stormwater Permit (MRP). The cities of Fairfield and Suisun City have joined to form the Fairfield-Suisun Urban Runoff Management Program to operate the storm sewer system and to prevent storm water pollution associated with municipal activities. Under terms of the MRP, permittees are required to identify tasks and programs to reduce the discharge of pollutants in storm water to the maximum extent practicable in a manner designed to achieve compliance with water quality standards and objectives. Since this TMDL does not impose new requirements but rather builds upon the current efforts, we anticipate municipalities will incur no additional costs. The ongoing costs for operations and maintenance of storm water system, inspections, enforcement, staff training, public education and outreach, and effectiveness monitoring will be incurred by the permittees with or without a requirement to meet the applicable DO objectives in streams discharging to Suisun Marsh.

*Managed Wetlands:* Costs to implement the candidate BMPs are dependent on the extent to which BMPs have already been implemented in the marsh. For the purpose of this assessment, each BMP listed is assumed to have been implemented separately from the other BMPs. In reality, some BMPs may be implemented concurrently or might be



needed only for a limited time, and therefore reduce the overall cost. Table 14-1 shows a summary of potential costs for the main reasonably foreseeable TMDL implementation measures. The cost of improvements to water control structures is given in a range of expenses. Individual project costs can vary greatly based upon cost of installation, types of water control structures, mobilization, and/or construction engineering. All costs are estimated to be completed using Prevailing Wage rates. The estimates are specified mainly for structural BMPs, which should be installed at the strategic locations where its benefit is maximized and most cost-effective. Thus, these costs are generally provided as per acre of application or per lineal foot of installation. Since, the majority of the water conveyance maintenance (grading and cleaning), and improvements (drain gates installation) at managed wetlands are conducted under the SMP, the costs incurred directly as a result of the TMDL are minimal.

**Table 14-1**  
**Summary of potential cost ranges of implementation**

<b>Implementation Action</b>	<b>Cost (low-high)</b>	<b>Unit</b>
SRCD staff resources to coordinate water management activities	Previously required no additional cost	Not applicable
<b>Vegetation and Soil Management:</b>		
Mowing to control green leafy vegetation	\$40 – \$50	Per acre of area treated
Selective spraying of herbicide (dry season) to control green leafy vegetation	\$150 – \$200	Per acre of area treated
<b>Water Management BMPs (every 5 – 10 years)</b>		
Improving existing interior water conveyance ditches (excavation):	\$6 – \$8	per lineal foot of ditch
Creation of new interior water conveyance ditches (excavation):	\$10 – \$12	per lineal foot of ditch
Creation of new interior water conveyance swales (grading):	\$4 – \$5	per lineal foot of ditch
Improving existing interior water conveyance swales (grading):	\$2 – \$3	per lineal foot of ditch
<b>Water Management BMPs (every 15 – 20 years)</b>		
Installation of new exterior drain gates (HDPE pipe and corrosive resistant flap gate and riser):	\$15,000-\$22,000 \$20,000-\$35,000	For 24" diameter pipe For 36" diameter pipe
Upgrading an existing Corrugate Metal Pipe (CMP) exterior drain or dual purpose structures to smooth wall HDPE pipe and corrosive resistant water control structures	\$25,000-\$45,000 \$40,000-\$55,000	For 24" diameter pipe For 36" diameter pipe

*Monitoring costs.*

The fall monitoring of DO prior and during the discharges from the managed wetlands is ongoing and does not represent a new cost under this TMDL. However, additional ambient monitoring may be needed to detect whether the water quality objectives have been achieved. In particular, there is limited monitoring data available for Montezuma Slough, which serves as a main migratory path for salmonids and is assigned with higher DO concentrations than those for the back-end sloughs. The specifics of this monitoring, such as the exact number of monitoring locations and sampling frequency have not yet been determined. For the purpose of a cost estimate, it is assumed that in addition to the existing water quality monitoring conducted in the northwest part of the marsh, 2 more locations will also be monitored in the remainder of the marsh. The initial capital outlay for continuous monitoring (YSI sonde, software, and deployment infrastructure) could be considerable (\$10,000-\$20,000). The annual ongoing costs to monitor basic water quality parameters (water temperature, pH, specific conductance and dissolved oxygen) at one location is approximately \$36,000<sup>1</sup>.

Assuming two monitoring stations and the period of data collection of approximately 6 months for each site, the annual cost for additional monitoring is estimated at \$56,000 to \$76,000. However, these initial and ongoing costs would presumably be offset by a reduction in costs associated with traditional discrete sampling. Reductions are expected in long-term operating costs due to reduced sampling, vehicle use (fuel and maintenance), and analysis costs as well as an opportunity to use the YSI sondes for other projects and studies. If continuous monitors are sufficiently maintained and staff are available to analyze the data collected, these instruments enhanced temporal resolution in ambient and operational data, and can help with early detection and taking action to prevent a low DO event from developing or worsening.

#### **Need for Housing**

The proposed water quality objectives would not restrict or alter the development of housing in Suisun Marsh because the marsh is not suitable for housing development.

#### **Need to Develop and Use Recycled Water**

There are no proposed restrictions on recycling of water due to dissolved oxygen. Adopting the recommended site-specific objectives will have no impact on the quality and quantity of wastewater available for recycling or reclamation in the region, and none of the alternatives considered would restrict the development or use of recycled water. The intent of the proposed water quality objectives is to improve water quality and protect beneficial uses in Suisun Marsh. Therefore, the proposed objectives are consistent with the need to develop and use recycled water.

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<sup>1</sup> Based on the USGS data collection in Tualatin River

#### **14.1.2 Water Code Section §13242 Analysis**

Water Code section 13242 requires that when adopting water quality objectives in the Basin Plan, a program of implementation for achieving the objectives must be included. The program must include, but not be limited to:

- Description of the nature of actions necessary to achieve the objectives, including recommendations for appropriate actions by any entity, public or private;
- Schedule for the actions to be taken;
- Description of surveillance to be undertaken to determine compliance with the objectives.

In regard to the proposed site-specific objectives for DO, the Suisun Marsh TMDL project lists actions necessary to achieve the proposed water quality objectives as described in the program of implementation in Chapter 12. It sets forth appropriate actions by public and private entities, a schedule for actions to be taken, and a monitoring program to determine compliance with the proposed water quality objectives. Accordingly, in addition to meeting the requirements of EPA TMDLs, it meets the requirements of § 13242 as well.

#### **14.1.3 Antidegradation Analysis**

The recommended SSOs for DO in Suisun Marsh are consistent with the State's Antidegradation Policy, contained in the State Water Resources Control Board Resolution 68-16, and the federal antidegradation policy (40 C.F.R. § 131.12). Antidegradation policies adopted at federal and State levels are intended to maintain existing water quality at levels necessary to protect existing and future beneficial uses.

The proposed DO objectives would not result in degradation of Suisun Marsh water quality compared to the DO concentrations currently observed in minimally impacted and fully tidal sloughs representative of natural DO conditions. DO objectives, unlike traditional objectives for toxic substances are region-specific because the DO regime is dependent on temperature, hydrology, and natural biological processes, all of which vary spatially and temporally. The conditions in the marsh are significantly different from the conditions in San Francisco Bay open waters, for which the current Basin Plan objectives were developed in 1975 and which do not take into account that DO concentrations in marshes and wetlands are lower due to naturally-occurring organic enrichment and limited tidal and wind mixing. In tidal marsh environments, the high quantity of organic matter is critical for wetland accretion and providing healthy and productive habitat for estuarine beneficial uses, even if it also lowers DO. In addition, the current Basin Plan objectives do not include daily or monthly limits to prevent acute and chronic effects of DO stress, and do not require continuous measurements to evaluate whether the objectives are met or not. This is essential to fully understand the DO concentrations, which show natural daily and seasonal fluctuations. Since the proposed objectives would maintain water quality in Suisun Marsh sloughs relative to the conditions through the 2000s and improve protection of listed juvenile salmonids by requiring a higher DO of 6.4 mg/L during spring migration (January-April), no degradation of water quality would occur by approving the proposed amendment.

Approval of the site-specific objectives would not cause degradation of water quality in any downstream water bodies (e.g., San Francisco Bay). The existing beneficial uses of Suisun Marsh, and the level of water quality necessary to protect them, will be enhanced by the TMDL to implement the proposed objectives. The proposed amendment would not result in water quality lower than that prescribed in the State water quality policies.

#### 14.2. PEER REVIEW AND SOUND SCIENTIFIC RATIONALE

##### ***14.2.1 Scientific Peer Review for DO Objectives and TMDL***

Pursuant to Health & Safety Code Section 57004, Basin Plan amendments with a scientific basis must be peer reviewed. Scientific peer review ensures that regulatory decisions and initiatives are based on sound science. Scientific peer review also helps strengthen regulatory activities, establishes credibility with stakeholders, and ensures that public resources are managed effectively.

The portions of this Staff Report (Sections 3,4,6,8,9,12) that provide scientific basis for establishing the site-specific objectives for DO, and the TMDL to implement these objectives were submitted for scientific peer review through the CalEPA peer review process. Peer review comments were received and incorporated into the revised Staff Report. Peer review comment letters will be addressed in the response to comments.

##### ***14.2.2 Scientific Peer Review for Mercury Objectives and TMDL***

The proposed Basin Plan amendment will extend applicability of the fish tissue-based water quality objectives for mercury from San Francisco Bay to Suisun Marsh sloughs, and establish a mercury TMDL with requirements that are the same as those of the already required and implemented by mercury TMDL for San Francisco Bay (Resolution No. R2-2004-0082). The proposed amendment does not contain new science that would require peer review. It represents an application of earlier, extensively peer reviewed work products, specifically, the 2004 San Francisco Bay TMDL, and the 2016 draft proposed rule for mercury water quality objectives and the program of implementation to amend the Water Quality Control Plan Control Plan for Inland Surface Water and Enclosed Bays and Estuaries of California.

The proposed amendment does not depart from the scientific approach of the other Basin Plan amendments from which it is derived. Therefore, additional peer review is not required.

#### 14.3. CEQA ENVIRONMENTAL ANALYSIS

This section presents the analyses required under CEQA when the Water Board adopts a Basin Plan amendment under the Water Board's certified regulatory program (Pub. Res. Code § 15251(g)). The Water Board is the lead agency responsible for evaluating the potential environmental impacts of Basin Plan amendments. Staff prepared the required environmental documentation, which include an Environmental Checklist and a written report (this Staff Report) that disclose any potentially significant environmental impacts of the Basin Plan amendment. This Staff Report, including the CEQA Checklist and analyses, constitute a substitute environmental documentation. A scoping meeting was held on May 12, 2017 to satisfy CEQA's recommendation to engage the public and interested stakeholders in consultation about the scope of the environmental analysis.

The State Water Board's regulations require a substitute environmental documentation to include: 1) a brief project description; 2) identification of any significant or potentially significant adverse impacts of the proposed project; 3) analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts; and 4) analysis of the reasonably foreseeable methods of compliance (Cal. Code Regs., tit. 23, § 3777, subd. (b)).

The environmental impact analysis evaluates the reasonably foreseeable environmental impacts of the implementation measures identified in the Implementation Plan (see Section 12). Specific implementation projects, such as wetland restorations or large-scale water management improvements at duck clubs may require additional CEQA analysis.

Overall, these analyses indicate that project will benefit the environment. It is not expected to have significant adverse impacts on the environment and will not cause immediate, large scale expenditures by the entities required to implement it. Although the precise implementation actions parties will use to achieve the objectives are not known at this time, the Checklist evaluates potential impacts from measures that are readily implementable, low-impact, and effective. They are generally consistent with the actions and recommendations of the 2014 Suisun Marsh Habitat Management, Preservation and Restoration Plan (SMP) and its programmatic EIS/EIR, which details and evaluates baseline conditions and the recommended managed wetlands activities (e.g., Table 2-5 in the EIS/EIR; SMP 2014) that have been initiated in Suisun Marsh, and comprises the analysis of impacts and mitigation measures. All potential adverse impacts of these activities, albeit small, had been already accounted for under the proposed mitigation measures.

These reasonable foreseeable methods of compliance with the proposed TMDL are not expected to significantly impact the environment.

#### *Project Description and Objectives*

The project would establish site-specific water quality objectives for DO in Suisun Marsh sloughs, extend water quality objectives for mercury to Suisun Marsh, establish a Total Maximum Daily Load (TMDL) and an Implementation Plan designed to achieve these objectives. The purpose of the TMDL is to achieve the narrative and numeric water quality objectives, to reduce occurrences of anthropogenically induced low DO in Suisun Marsh sloughs, reduce methylation and bioaccumulation of mercury, and thereby protect the beneficial uses of these waterbodies. The project objectives are:

- Update the Basin Plan to incorporate the site-specific water quality objectives for DO considering species-specific DO requirements and types and life stages of fish and aquatic organisms present in Suisun Marsh, and calculated based on the best available scientific information.
- Extend mercury objectives already applicable to San Francisco and Suisun Bays to Suisun Marsh;
- Protect the overall aquatic health beneficial uses and enhance its aesthetic and recreational values;

- Comply with the CWA requirement to adopt a TMDL for Section 303(d)-listed water bodies;
- Set numeric targets for DO reflecting the natural marsh conditions and protective of the most sensitive beneficial uses;
- Attain DO objectives as quickly as feasible;
- Achieve the numeric targets and attain water quality standards by maximizing use of existing regulatory tools and implementing non-structural BMPs at managed wetlands on a voluntary basis.

#### *Reasonable Foreseeable Methods of Compliance*

The TMDL Implementation Plan (Sections 12.1 through 12.4) identifies the tasks and the schedule necessary to achieve compliance with the numeric targets, which are the same as the proposed water quality objectives. The candidate water quality control measures necessary to meet the TMDL targets and a BMP effectiveness and water quality monitoring program are currently implemented in the western portion of the marsh under the U.S. EPA grant, the Suisun Marsh Managed Wetland BMP Water Quality Improvement Pilot Project. The BMPs, which modify water and vegetation management at managed wetlands, are designed to use the existing infrastructure and scheduled maintenance activities to enhance water quality and existing managed wetland values, tidal habitats, endangered species habitats, and levee integrity. All measures proposed in the TMDL are consistent with existing local, regional, and statewide regulations. The cumulative effects of potential implementation actions are also discussed in Section 13.3.4. Possible implementation actions are listed in Table 12-2.

#### **14.3.1 Environmental Checklist**

The Water Board has based its Environmental Analysis on the Checklist and sample questions found in Appendix G of the CEQA Guidelines (14 Cal. Code Regs. Appendix G). The Checklist and the discussion that follows evaluate the environmental impacts of the TMDL implementation activities listed in Table 12-2. Some TMDL implementation activities solely involve planning or assessment, and water quality monitoring. These activities are not evaluated in the Environmental Analysis because they do not result in direct or reasonably foreseeable indirect physical changes in the environment.

## ENVIRONMENTAL CHECKLIST

- Project Title:** Basin Plan Amendment to Establish Water Quality Objectives and Total Maximum Daily Load (TMDL) for Dissolved Oxygen/Organic Enrichment in Suisun Marsh Sloughs and to Add Suisun Marsh to San Francisco Bay Mercury TMDL
- 2. Lead Agency Name and Address:** California Regional Water Quality Control Board San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, California 94612
- 3. Contact Person and Phone:** Barbara Baginska, (510) 622-2474
- 4. Project Locations:** Suisun Marsh, California
- 5. Project Sponsor's Name & Address:** California Regional Water Quality Control Board San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, California 94612
- 6. General Plan Designation:** Not Applicable
- 7. Zoning:** Not Applicable

**8. Description of Project:**

The project is a Basin Plan amendment to revise the existing water quality objectives for dissolved oxygen in Suisun Marsh sloughs, the provisions to implement these objectives, to establish a concentration-based TMDL for dissolved oxygen/organic enrichment, and to extend the San Francisco Bay Mercury TMDL to Suisun Marsh.

**9. Surrounding Land Uses and Setting:**

Suisun Marsh is a mosaic of tidal, seasonal and managed wetland habitat at the center of the San Francisco Bay-Delta Estuary. The Marsh is bounded to the west, north and east by hills and to the south by Suisun, Grizzly, and Honker Bays. Montezuma Slough, the largest slough in the marsh, runs from east to west between the Sacramento-San Joaquin Delta and Suisun Bay. Major sloughs draining to Montezuma Slough are Denverton and Nurse sloughs. The second largest slough in the area is Suisun Slough, which divides the marsh into eastern and western portions. Tributaries to Suisun Slough include Cordelia, Goodyear, and several small dead-end sloughs in the northwestern portion of the marsh (Figure 8-1). The managed wetlands of Suisun Marsh are managed specifically for nesting and wintering waterfowl and, together with the tidal marshes, provide important habitat for resident and migratory waterfowl and shorebirds, and other native and special-status wildlife. Urban and agricultural areas are found adjacent to the marsh.

**10. Other public agencies whose approval is required:**

The State Water Board, the California Office of Administrative Law, and the U.S. EPA must approve the Basin Plan amendment following adoption by the Water Board.

**11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun?**

California Native American tribes in the project area were informed about the project but did not request consultation pursuant to Public Resources Code section 21080.3.1.

**ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:**

We have determined that the project would not have any significant adverse impacts on the environment; hence, there are no physical, biological, social and/or economic factors that might be affected by the proposed project. Please see Section 14.3.3 for additional explanation.

<input type="checkbox"/>	Aesthetics	<input type="checkbox"/>	Agriculture and Forestry	<input type="checkbox"/>	Air Quality
<input type="checkbox"/>	Biological Resources	<input type="checkbox"/>	Cultural Resources	<input type="checkbox"/>	Geology/Soils
<input type="checkbox"/>	Greenhouse Gas Emissions	<input type="checkbox"/>	Hazards and Hazardous Materials	<input type="checkbox"/>	Hydrology/Water Quality
<input type="checkbox"/>	Land Use/Planning	<input type="checkbox"/>	Mineral Resources	<input type="checkbox"/>	Noise
<input type="checkbox"/>	Population/Housing	<input type="checkbox"/>	Public Services	<input type="checkbox"/>	Recreation
<input type="checkbox"/>	Transportation/Traffic	<input type="checkbox"/>	Tribal Cultural Resources	<input type="checkbox"/>	Utilities/Service Systems
<input type="checkbox"/>	Mandatory Findings of Significance				



This checklist identifies physical, biological, social and economic factors that might be affected by the proposed project. In many cases, studies performed in connection with the project indicate no impacts. A NO IMPACT answer in the last column reflects this determination. A clarifying discussion is included either following the applicable section of the checklist or is within the body of the document itself. The words "significant" and "significance" used throughout the following checklist are related to CEQA. The questions in this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
<b>I. AESTHETICS:</b> Would the project:				
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>II. AGRICULTURE AND FOREST RESOURCES:</b> In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**III. AIR QUALITY:** Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:

a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Create objectionable odors affecting a substantial number of people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**IV. BIOLOGICAL RESOURCES:** Would the project:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**V. CULTURAL RESOURCES:** Would the project:

a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Disturb any human remains, including those interred outside of dedicated cemeteries?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**VI. GEOLOGY AND SOILS:** Would the project:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**VII. GREENHOUSE GAS EMISSIONS:** Would the project:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**VIII. HAZARDS AND HAZARDOUS MATERIALS:** Would the project:

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**IX. HYDROLOGY AND WATER QUALITY:** Would the project:

a) Violate any water quality standards or waste discharge requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Otherwise substantially degrade water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
j) Inundation by seiche, tsunami, or mudflow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
<b>X. LAND USE AND PLANNING:</b> Would the project:				
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XI. MINERAL RESOURCES:</b> Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XII. NOISE:</b> Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
<b>XIII. POPULATION AND HOUSING:</b> Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XIV. PUBLIC SERVICES:</b>				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other public facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
<b>XV. RECREATION:</b>				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XVI. TRANSPORTATION/TRAFFIC:</b> Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>



	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
<b>XVII. TRIBAL CULTURAL RESOURCES:</b> Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>XVIII. UTILITIES AND SERVICE SYSTEMS:</b> Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Comply with federal, state, and local statutes and regulations related to solid waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
<b>XIX. MANDATORY FINDINGS OF SIGNIFICANCE</b>				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

#### 14.3.2 Environmental Checklist Discussion

The analysis of potential environmental impacts is based on the foreseeable methods of compliance available to improve dissolved oxygen conditions in Suisun Marsh sloughs, and the level of significance is based on the current conditions.

The proposed project will not have any significant adverse impacts on the environment. The proposed site-specific objectives are fully protective of the most sensitive beneficial uses, as fully explained throughout the Staff Report and the TMDL, which implements the objectives.

The managed wetland activities related to the improvements, maintenance and repairs of levees, and to construction, cleaning and maintenance of pipes, water structures and interior ditches, could also contribute to improving water quality despite the fact that they may result in short-term minor impacts. However, these activities have not been identified as direct candidate control measures in the Implementation Plan, and are not evaluated as part of this analysis because they represent activities already considered by the environmental analysis conducted for the SMP EIS/EIR.

An explanation for each box checked on the Environmental Checklist is provided below:

##### *I. Aesthetics*

Physical changes to the aesthetic environment as a result of the Basin Plan amendment are expected to be minimal, such as changes to management of vegetation, or temporary, as well as limited to the interior areas of the managed wetlands. Such actions would not

degrade the existing visual character or quality of the marsh or its surroundings and would not create any new source of light or glare. Actions or projects implemented would not occur near a designated state scenic highway, and, therefore, would not result in adverse aesthetic impacts to state scenic highways.

## *II. Agriculture and Forest Resources*

The proposed Basin Plan amendment and implementation actions would not result in any changes to agricultural resources and would not contribute to conversion of farmland to non-agricultural use since there is no row crop agriculture in Suisun Marsh. It would not affect agricultural zoning or any Williamson Act contract, and would not have any adverse impact in this regard because Suisun Marsh is zoned as marsh.

## *III. Air Quality*

The proposed Basin Plan amendment will not have adverse impacts on air quality because it will not cause any change in population or employment, ongoing traffic-related emissions, or require any large-scale construction. The Basin Plan amendment would not conflict with applicable air quality plans. It would not expose sensitive receptors to ongoing pollutant emissions and therefore would not pose health risks nor create objectionable odors.

## *IV. Biological Resources*

The amendment is designed to protect and enhance biological resources, including aquatic organisms, wildlife and rare and endangered species. Although the proposed site-specific water quality objectives for dissolved oxygen are lower than those established for the tidal waters of San Francisco Bay (upstream of Carquinez Bridge) water quality and hydrologic conditions in the sloughs in Suisun Marsh naturally have lower DO levels than open, tidal waters of Suisun Bay. The DO objectives were derived to protect all ecologically relevant species present in Suisun Marsh, including threatened and endangered species like salmonids and green sturgeon. Compliance with the DO objectives will have the added benefit of limiting mercury methylation, which will reduce health risks for fish, wildlife, and humans. Accordingly, the proposed Basin Plan amendment will not degrade the quality of the environment, substantially reduce fish or wildlife habitat, cause fish or wildlife populations to drop below self-sustaining levels, or threaten to eliminate a plant or animal community.

The recommended BMPs to improve DO conditions are predominantly non-structural BMPs, and therefore they would not have a substantial adverse effect, either directly or indirectly, on any species listed as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or identified by the CDFW or USFWS. Implementation of the proposed action would not result in the physical alteration of a natural environment such that there would be any adverse effects on federally-or State-listed species. The proposed action would not conflict with any Habitat Conservation Plans, Natural Community Conservation Programs, or local policies designed to protect biological resources. The project would not result in a depletion of biodiversity in aquatic and riparian habitats near the project area.

### *V. Cultural Resources*

This proposed Basin Plan amendment is not expected to have an impact on cultural resources, because implementation actions would not involve construction in areas with known cultural resources, changes to, or demolition of historic structures.

Likely TMDL implementation actions by municipalities to control mercury or manage DO, such as creation of green infrastructure or placement of stormwater treatment structures, would include only minor construction in existing roadways and stormwater facilities and would not require changes to historic buildings or structures.

### *VI. Geology and Soils*

Implementation of best management practices as recommended under the proposed Implementation Plan, and as necessary to comply with the water quality objectives and the TMDL targets, would not require construction of habitable structures or lead to an increase in population. Therefore, implementation actions would not create or increase any human safety risks related to fault rupture, seismic ground-shaking, ground failure, or landslides. The activities would be limited to the interior areas of managed wetlands, which are flat, and would not result in soil erosion or instability. These activities would be limited by both volume and geographic location, thus minimizing any potential risks even further. There would be no impacts from septic tanks or alternative wastewater disposal systems from the project.

### *VII. Greenhouse Gas Emissions*

This proposed Basin Plan amendment is not expected to generate significant greenhouse gas emissions, because it would not result in any construction projects or otherwise cause direct or indirect change in the environment. Implementation of non-structural vegetation and water management BMPs may result in incidental GHG emissions.

### *VIII. Hazards and Hazardous Materials*

The proposed establishment of site-specific DO objectives and extension of the Mercury TMDL to Suisun Marsh is designed to improve water quality in the marsh, specifically to minimize exposure of humans and wildlife to harmful methylmercury. Anticipated implementation actions to increase dissolved oxygen are also expected to reduce mercury methylation and thereby reduce bioaccumulation of mercury in fish, wildlife, and humans. Control actions by Fairfield, Suisun City, and the Fairfield-Suisun Sanitary District to reduce mercury levels in discharges are already required by the Mercury Watershed Permit (R2-2017-0041) and by the Municipal Stormwater Permit; therefore, implementation of this TMDL is not expected to increase transport, use, disposal, handling, or emissions of hazardous materials. The project would not interfere with any emergency response plans or emergency evacuation plans, and would not affect the potential for wildland fires or expose people or structures to an increased risk from wildland fires.

Although there is one site within Suisun Marsh of approximately 0.3 acres identified on the hazardous waste and substance material sites list, implementation of this TMDL will not affect this site, which is capped with concrete and surrounded by a chain-linked

fence. Accordingly, this project to create a Suisun Marsh TMDL will have no impact relating to hazardous materials.

#### *IX. Hydrology and Water Quality*

This project is intended to improve water quality in Suisun Marsh sloughs and enhance fish and wildlife habitat. The proposed TMDL and the revised DO objectives will have beneficial impact on water quality, as changes to water management at the managed wetlands will minimize occurrences of low DO conditions in the adjacent sloughs, which, in turn, will ensure that sloughs meet water quality objectives, and that beneficial uses are protected and restored. The implementation actions listed in Table 12-2 would not result in violations of water quality standards or waste discharge requirements.

The candidate non-structural BMPs would not affect groundwater supplies, substantially alter the existing drainage pattern, contribute additional runoff or interfere with the conveyance of urban storm water. Suisun Marsh is designated as a resource conservation area and managed specifically for nesting wintering waterfowl, and to provide habitat for a variety of resident and migratory waterfowl, shorebirds and other native and special-status species. Therefore, no new housing would be considered or constructed because of this project. The Implementation Plan encourages early implementation of the readily available, low-cost, non-structural BMPs, which have already demonstrated a positive effect on the environment and water quality.

#### *X. Land Use and Planning*

The Basin Plan amendment regulates water quality, would not result result in development of any structures or physical facilities, and would therefore not physically divide an established community. Long-term implementation actions could include conversion of managed wetlands to tidal marsh; however, any such proposed conversions would be completed in accordance with the Bay-Delta Conservation Plan, the Suisun Marsh Protection Plan, applicable Habitat Conservation Plans or Natural Community Conservation Plans, as well as local, State, and federal land use policies. Actions are all in line with the Suisun Marsh Restoration Plan.

#### *XI. Mineral Resources*

No mineral resources would be affected by the proposed action.

#### *XII. Noise*

The Basin Plan amendment regulates water quality and would not directly cause any change or increase in noise levels.

#### *XIII. Population and Housing*

The Basin Plan amendment will not have any impact on housing and will not affect the population of Suisun Marsh. The project will not induce growth through such means as construction of new housing or businesses, or by extending roads or infrastructure. Suisun Marsh is designated as a resource conservation area, therefore, no new housing would be considered because of the project. The very limited housing that exists in

Suisun Marsh and its population would not be displaced and no replacement housing would be necessary.

#### *XIV. Public Services*

The Basin Plan amendment would not affect populations or involve construction or substantial alteration of government facilities. The Basin Plan amendment would not affect service ratios, response times, or other performance objectives for any public services, including fire protection, police protection, schools, or parks.

#### *XV. Recreation*

The Basin Plan amendment regulates water quality and would not directly affect recreational activities. Implementation of vegetation and water management BMPs at duck clubs is not expected to have any effect on the duck hunting experience. By improving water quality, the proposed project would enhance and protect the environmental value and recreational resources of Suisun Marsh. In particular, ensuring higher DO levels will help sport fish populations thrive, while reducing mercury methylation will help reduce exposure of recreational and subsistence fishers to mercury.

#### *XVI. Transportation / Traffic*

The Basin Plan amendment would not increase population or provide employment, it would not affect transportation facilities or generate any additional traffic. Nor would the proposed action change any policy, plan, or program.

#### *XVII. Tribal Cultural Resources*

Implementation of the Basin Plan amendment is not expected to affect or change any Tribal cultural resources because it will not involve construction, development, or other changes to the marsh landscape. Implementation will not affect sites listed on the state or federal register of historic places. Pursuant to AB 52, the Water Board notified Tribal organizations affiliated with Solano County of the project, but received no requests for consultations.

#### *XVIII. Utilities and Service Systems*

Since the Basin Plan amendment would not affect water demands or supplies, the project would not exceed wastewater treatment requirements or result in construction or expansion of the wastewater treatment facilities or stormwater drainage facilities. The proposed Basin Plan amendment would have no impacts on utilities or service systems.

#### *XIX. Mandatory Findings of Significance*

The proposed Basin Plan amendment is intended to restore and enhance water quality and protect biological resources, including fish, wildlife, and rare and endangered species in Suisun Marsh. The proposed DO objectives and the TMDL are designed specifically to benefit fish and wildlife species by increasing DO levels in the sloughs, and by preventing occurrences of low DO conditions, which in the past had led to fish kills. The DO objectives were derived to protect sensitive species and life stages present in Suisun Marsh including threatened and endangered species such as salmonids. In addition, actions to raise DO are also expected to limit mercury methylation, thereby reducing